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**PATENT APPLICATION OF**  
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**FIREARMS SAFETY DEVICE**

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### Firearms safety device

The present invention relates to a safety device for firearms, in particular for being inserted into the barrel of a firearm.

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Devices for securing firearms against unauthorised use are disclosed in DE 299 20 895 U1, DE 199 57 160 C1 and DE 299 20 918 U1. These documents relate to inserts that are used in firearm barrels and are only removable by electrical discharge.

10 According to DE 299 20 895 U1, a locking portion is to this end inserted into the muzzle end of a barrel, said locking portion comprising a head engaging with the muzzle and consisting of a material that is merely workable by electrical discharge. A rod extending into the magazine is rigidly connected to this head and moreover, the magazine end of the rod is rigidly connected to an insert within the magazine. Said insert has a diameter that is  
15 larger than that of the barrel bore and consists of a material that cannot be machine-drilled. The rod extends through the entire barrel and is secured against being detached by the insert at the magazine end and by the locking portion at the barrel end.

DE 199 57 160 C1 and DE 299 20 918 U1 describe the use of an expanding sleeve. A first  
20 expanding device is releasably inserted into one end of the expanding sleeve which is thereby pressed against the inner wall of the barrel so that it gets jammed. A second expanding device is inserted into the other end of the expanding sleeve. If the second expanding means is subjected to axial pressure, the expanding sleeve and the inner wall of the barrel interlock. The one end of the expanding sleeve is covered by a protective disc  
25 which can only be destroyed by electrical discharge if the expanding sleeve is to be removed from the barrel.

Firearms safety devices according to the aforementioned prior art references, however, can also be removed from the firearm barrels by unauthorised people by sawing off the front  
30 portion of the barrel (DE 299 20 895 U1) or if they possess EDM equipment. Consequently, they do not effectively and permanently secure the previously secured firearms against unauthorised use. Moreover, it is extremely complicated for authorised

people to remove these prior art firearms safety devices if the firearms are to be re-used. Using them for putting weapons in use (such as sporting weapons) at safe is unthinkable.

5 In view of this prior art, it is the object of the present invention to provide improved firearms safety devices and an improved method of putting firearms at safe.

This object is achieved by the features according to the claims.

10 The invention is based on the idea of providing a safety device, in particular for firearms, against unauthorised use comprising at least one clamping or locking portion that is insertable into a tube, an oblong recess, a firearm barrel or the like and is optionally lockable and/or unlockable or tightly clampable therein and/or detachable therefrom. Moreover, a control unit, preferably an electronic authentication means, is provided that is capable of identifying a user and, if the user is authorised, makes at least the clamping  
15 portion clampable in the tube, the oblong recess, the firearm barrel or the like and detachable therefrom. Preferably, the safety device is completely insertable into the barrel of a firearm.

20 Moreover, an activation and deactivation means may be provided which, upon authentication by the control unit, enables or prevents locking and/or unlocking or clamping and/or detachment via a transmission means that is accessible from outside and protected against manipulation. This is preferably effected by a deactivation element which has a movement from outside for activating a mechanism inside the safety device transmitted to the mechanism or prevents such a transmission. This is preferably achieved  
25 by coupling or decoupling or blocking said movement.

Furthermore, the invention relates to severance protection means provided in the locking portion. Due to this severance protection means, the locking portion at least partially radially expands upon locking or clamping in case of an essentially axial force caused by  
30 manipulation so that the locking portion is locked or clamped farther into the barrel and/or the cartridge chamber.

Moreover, the invention relates to any combination of the embodiments mentioned above and the respective methods.

5 The subject-matter of the present invention shows remarkable advantages vis-à-vis the prior art, i.e. that a weapon may be secured against unauthorized use reliably but nevertheless quickly, extreme resistance may be put up to violent manipulations and "intelligent" manipulations by the subject-matter of the invention and the production of a firearms safety device according to the invention is nonetheless economical.

10 Moreover, a safety device according to the invention has a low susceptibility to manipulation and effectively puts a weapon at safe, irrespective of the barrel length of the weapon. Furthermore, the safety device is invisible from outside for being within the barrel and is therefore particularly suitable for weapons that are used as decoration, such as inherited weapons.

15 Preferred embodiments of the invention are illustrated exemplarily in the following Figures, in which:

20 Fig. 1 shows a schematic view of a first inventive embodiment of a one-piece safety device according to the invention, in particular for use in firearms;

Fig. 2a shows a schematic view of a second embodiment of a two-piece safety device according to the invention, in particular for use in firearms;

25 Fig. 2b shows a schematic view of a further embodiment of a two-piece safety device according to the invention which is slightly modified as compared to Fig. 2a; and

Fig. 3 shows a schematic view of a preferred operating means according to the invention for operating a safety device according to the invention.

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The same elements and elements having the same function bear the same reference signs in the Figures. Figures 1 and 2a/2b in particular show a safety device 1 according to the invention for securing a firearm against unauthorised use, said safety device preferably

comprising a locking portion 20 or two locking portions 20a and 20b which is/are insertable into the barrel of a firearm that is not depicted and is/are optionally lockable therein and/or unlockable or is/are clampable to the barrel and/or detachable therefrom. The term "locking portion" designates a portion enabling positive and/or frictional engagement with the inside of a firearm barrel.

Preferably, the safety device is dimensioned such that the locking portions 20 can be arranged in the rear part of the barrel of a firearm so that the safety device may not be removed by simply sawing off the barrel and the insertion of a cartridge or opening and revolving the cylinder of a revolver may be prevented.

Moreover, a control unit 10 is provided that can authenticate a user and, upon authentication, locks and/or unlocks or clamps at least the locking portion 20 in the firearm barrel 100 (cf. Fig. 3) and/or makes the safety means detachable. Preferably, the control unit 10 is provided with an electronic means (not shown) that can authenticate a user. Authentication can for instance be effected electronically, (electro)magnetically, inductively, optically, mechanically and/or acoustically.

According to an embodiment of the invention, the safety device 1 is designed such that it is completely insertable into the barrel 100 and/or the cartridge chamber for securing the firearm. To this end, the safety device has to be smaller than the diameter of the barrel. Preferably, the safety device 1 is essentially cylindrical and thus has a smaller diameter than the inner diameter of the weapon barrel.

According to a further aspect of the invention, the safety device is provided with transmission means 40a, 21 for coupling it to an operating means 2-6 (cf. Fig. 3), by means of which a user can optionally lock and/or unlock the safety device 1 from outside or clamp it and/or make it detachable therefrom. Moreover, an activation means 26 is provided which, upon authentication by the control unit 10, enables or prevents locking and/or unlocking or clamping and detaching via the transmission means 40a.

This is preferably effected by a deactivation element 26 that has a movement from outside transmitted via an armouring 40a to a mechanism inside the safety device for operating

said mechanism or prevents said transmission. This is preferably effected by coupling or decoupling or blocking the movement.

5 A further aspect of the invention relates to a severance protection means 41 that is arranged in or at the locking portion 20. The severance protection means 41 is provided with at least one tilted element 41 that is arranged in the locking portion 20 and is positioned and designed such that it at least partially radially expands the locking portion after locking or clamping if an essentially axial force caused by manipulation is applied so that the locking portion 41 is anchored farther inside the barrel 100 which is optionally  
10 even permanently damaged. Preferably, each side of the safety device 1 is provided with a severance protection means 41a, 41b. Moreover, each severance protection means 41 is provided with an expansibility that is graded to the outside if inserted. Fig. 2, for instance, shows that towards the outside, each severance protection means 41a, 41b is provided with a plate-shaped element with greatest thickness and, towards the inside, with a plate-shaped  
15 element with lowest thickness. If an axial force resulting from manipulation is applied, the elements of the severance protection means 41 with lower expansibility preferably generate the force necessary for expanding the elements with greater expansibility.

In a safety device 1 having an essentially circular inner diameter at the respective location,  
20 the plate-shaped elements of the severance protection means 41 may be inclined ovals that adapt to the inner diameter. In case of an axial force, these plate-shaped elements would be erect and would moreover expand the safety device 1 at these places and wedge it farther down the barrel.

25 Moreover, Figures 1 and 2a/2b show preferred embodiments of the safety device 1 according to the invention, said safety device comprising at least one armouring 40a, 40b protecting the safety device against unauthorised manipulation from outside.

Moreover, preferably, the safety device is provided with a first armouring 40a that protects  
30 the safety device within the barrel 100 against unauthorised manipulation from the barrel-muzzle end and a second armouring 40b that protects the safety device within the barrel 10 against unauthorised manipulation from the cartridge chamber end (cf. also Fig. 3).

Preferably, the armouring 40 comprises a ceramic material and/or diamond and, in a particularly preferred embodiment, is completely made of one of these materials. If an aforementioned preferred severance protection means 41 is provided, this severance protection means 41 absorbs an essentially axial mechanical energy that is manipulatively applied from outside to the armouring behind the armouring 40 such that the resultant force on the armouring 40 is reduced in order to prevent it from breaking into pieces. This is particularly advantageous with the aforementioned relatively fragile materials. Due to the presence of the severance protection means 41, the manipulatively applied mechanical energy is used to clamp the safety device 1 more tightly within the barrel. In a further preferred embodiment, the severance protection means 41 can be dimensioned such that, starting with a predetermined threshold value, the manipulatively applied mechanical energy is used to destroy the barrel.

Preferably, a locking portion 20 is provided with at least one clamping means 22 that is lockable within the barrel 100 of a weapon such that the safety device cannot be removed from the barrel 100. The locking portion 20 comprises at least one clamping means 22 that can preferably be activated from outside via an actuator 40a, 21, such as preferably the armouring 40a and a thread 27a connected thereto, unlocking being impossible unless an inactivation by the control unit 10 is lifted. The entire actuator 40a, 21 is activated from outside by rotating the armouring 40a. Preferably, the actuator 40a, 21 is provided with a predetermined breaking point 29 that is shaped and dimensioned such that the actuator 40a, 21 is permanently inactivated in case of an unauthorised manipulation (cf. Figs. 1 and 2b).

In a further preferred embodiment as shown in Figs. 1 and 2b, the actuator 21 is led through a bore in the expandable thread 27 or 27a and is connected with the latter near the deactivation element 26.

Preferably, the clamping means 22 is provided with at least one expandable clamping jaw 23, cf. Fig. 1. Additionally, a second clamping means 22 that is not operable from outside can be provided, as shown in Figs. 2a and 2b.

The clamping means 22 is preferably provided with at least one expansion means 24 which expands the clamping jaw 23 or the clamping jaws 23a, 23b upon actuation of an actuator 40a, 21.

5 The expansion means 24 is preferably essentially arranged within the clamping jaw 23 and comprises, in a further preferred embodiment, at least one wedge surface that is movable with respect to a corresponding surface of the clamping jaw 23 so that the latter may be expanded. The expansion means 24 is preferably provided with at least one expanding thread 27 which may be moved axially with respect to the respective surface of the  
10 clamping jaw 23 by actuating the actuator 21.

The locking portion 20 is preferably provided with at least one clamping means that is clampable within the barrel 100 or the cartridge chamber (not shown) of a weapon, its clamping effect being increased as the force, such as a tension and/or pressure and/or  
15 rotation, applied to at least one end that is accessible from outside increases.

In a further preferred embodiment, an activation means 11, 25, 26 is provided with an actuator 11 that is controllable via the control unit, a spindle 25 that is rotatable via the actuator and a deactivation element 26 that is operable via the spindle 25, wherein, if  
20 operated, the deactivation element 26 prevents the expanding thread 27 from being rotated.

Furthermore, a mechanical potential that has to be overcome for actuating the deactivation element (preferably by means of a spring, not shown) prevents manipulation by shaking.

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The control unit 10 is preferably provided with an electronic means 10 which essentially carries out a user authentication. Preferably, the electronic means 10 is supplied with energy from outside via an electric connection 12 (cf. Fig. 1). Via this connection 12, the authentication data are exchanged in a further preferred embodiment.

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A further preferred embodiment is moreover provided with a means that inhibits/diverts the manipulatively applied electric and/or magnetic energy such that no opening is



possible. In a further preferred embodiment, the inhibition/diversion means is an element for burning through or a fuse that inhibits or interrupts the current flow.

5 Alternatively or additionally, the inhibition/diversion means against manipulatively applied energy may be designed such that manipulatively applied energy is conducted past the actuator 11. As a further alternative, the inhibition/diversion means against manipulatively applied energy may be designed such that the manipulatively applied energy conducted to the actuator 11 by pre-adjustment such that it is actuated towards inactivation or activates the deactivation element 26.

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According to the invention according to Figs. 2a and 2b, a second locking section 20b may alternatively be provided which is insertable into and clampable or lockable within the barrel 100 of the firearm separately from the remaining safety device. Preferably, a second expanding thread 27b via which a second expanding cone 24b is axially movable is provided, the second expanding thread 27b being rotatable via its inner end. Fig. 2b illustrates the second locking portion 20b that is separated from the remaining safety device.

20 In this case, upon locking the second locking portion, the remaining safety device is inserted into the barrel 100 of the weapon up to the second locking portion 20b and locked. Locking may be effected to the barrel and/or the second locking portion. Afterwards, the second locking portion is no longer lockable/unlockable.

25 According to the invention, the second locking portion 20b may be designed such that it can be arranged in the cartridge chamber and/or the barrel 100.

A further aspect of the invention relates to an operating means 2-6, in particular for any of the aforementioned safety devices 1 (cf. Fig. 3). To this end, a coupling means 4, 5, 6 is provided for coupling the operating means to a transmission means 40a of the safety device 1 and for transmitting an authentication request to the safety device 1 and/or a force for locking and/or unlocking or clamping and detaching the safety device 1 from the barrel 100 and/or a cartridge chamber.

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The coupling means 4, 5, 6 comprises an engagement means 5, the transmission means being established by an armouring 40a of the safety device 1 so that the engagement means 5 can engage with and rotate the armouring 40a. Preferably, the engagement means 5 is provided with claws matching the respective recesses in the armouring 40a.

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Preferably, the coupling means 4, 5, 6 is provided with an electric contacting means 6 via which an authentication request can be transmitted to the safety device 1. In such an embodiment, the safety device 1 is provided with a respective connection, preferably within the armouring 40b.

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In a further preferred embodiment, a gripping means 3 is provided to which a user can apply a rotation and which subsequently transmits the rotation via the coupling means 4 to the transmission means or the armouring 40a of the safety device 1. In such a case, a respective driving apparatus arranged, e.g., in a control means 2 is unnecessary although this variant, which is convenient for the user, is also possible. Preferably, the gripping means 3 is a turning actuation knob 3 which transmits the rotation applied by the user to a rod 4 and the armouring 40a and the thread 27a of the safety device 1 upon authentication of the user by the control unit 10.

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In a further preferred embodiment, an electronic control unit 2 is provided which can be operated via a computer and, if necessary, transmits an authentication request to the electric contacting means 6. Moreover, safety devices 1 according to the invention could be programmed by the computer and the operating means 2-6. To this end, preferably proven crypto-algorithms can be used.

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